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(54) **SMART HOST POWER SUPPLY DETECTION FOR PC CARD WIRELESS MODEM**

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H04B 1/38 (2006.01)
H04M 1/00 (2006.01)

(52) **U.S. Cl.** **455/558**; 455/127.1; 455/571; 455/572; 455/552.1; 455/414.1; 375/222

(58) **Field of Classification Search** 455/558, 455/557, 571, 572, 573, 574, 552.1, 127.1, 455/127.2, 414.1; 375/222; 713/300, 340
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,697,076 A * 12/1997 Troyk et al. 455/127.1
5,768,147 A 6/1998 Young
5,778,325 A 7/1998 Lindell et al.
5,805,473 A 9/1998 Hadderman 364/707
5,999,832 A * 12/1999 Vannatta et al. 455/575.1
6,028,755 A * 2/2000 Saeki et al. 361/91.1
6,169,884 B1 * 1/2001 Funk 455/522
6,285,092 B1 9/2001 Kawahara et al.
2001/0042152 A1 11/2001 Kobayashi
2004/0198288 A1 * 10/2004 Sadowski 455/259

* cited by examiner

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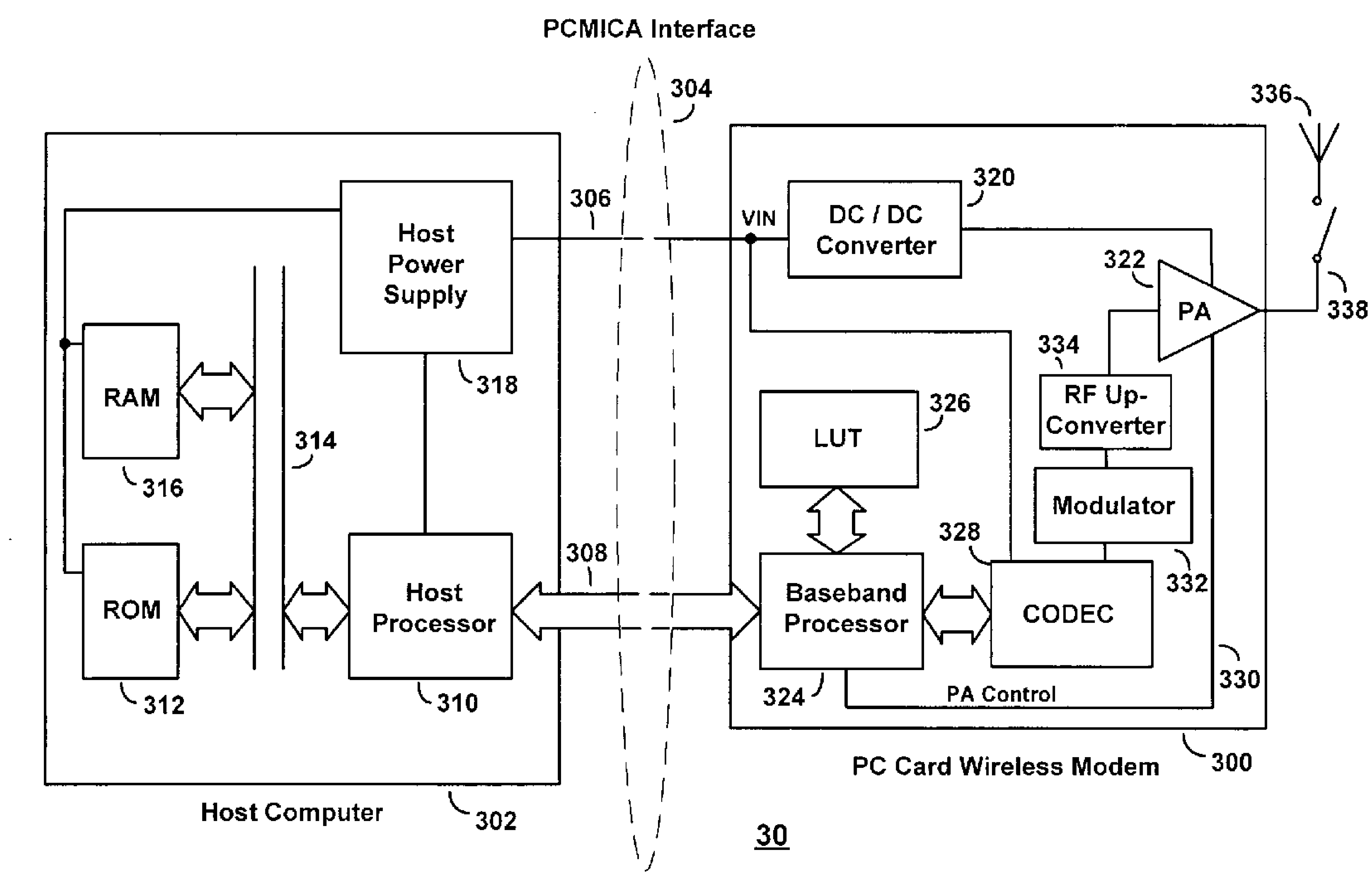
(57) **ABSTRACT**

Methods of and apparatuses for characterizing the power supplying capabilities of host power supplies providing power to wireless modems. According to an exemplary method, an equivalent series resistance of the power supply is determined and compared to a plurality of maximum equivalent series resistance values associated with a corresponding plurality of transmission power classes. Each power class is designated as a permissible power class at which the wireless modem may be configured to transmit, for each maximum equivalent series resistance value that is greater than the equivalent series resistance of the power supply.

30 Claims, 7 Drawing Sheets



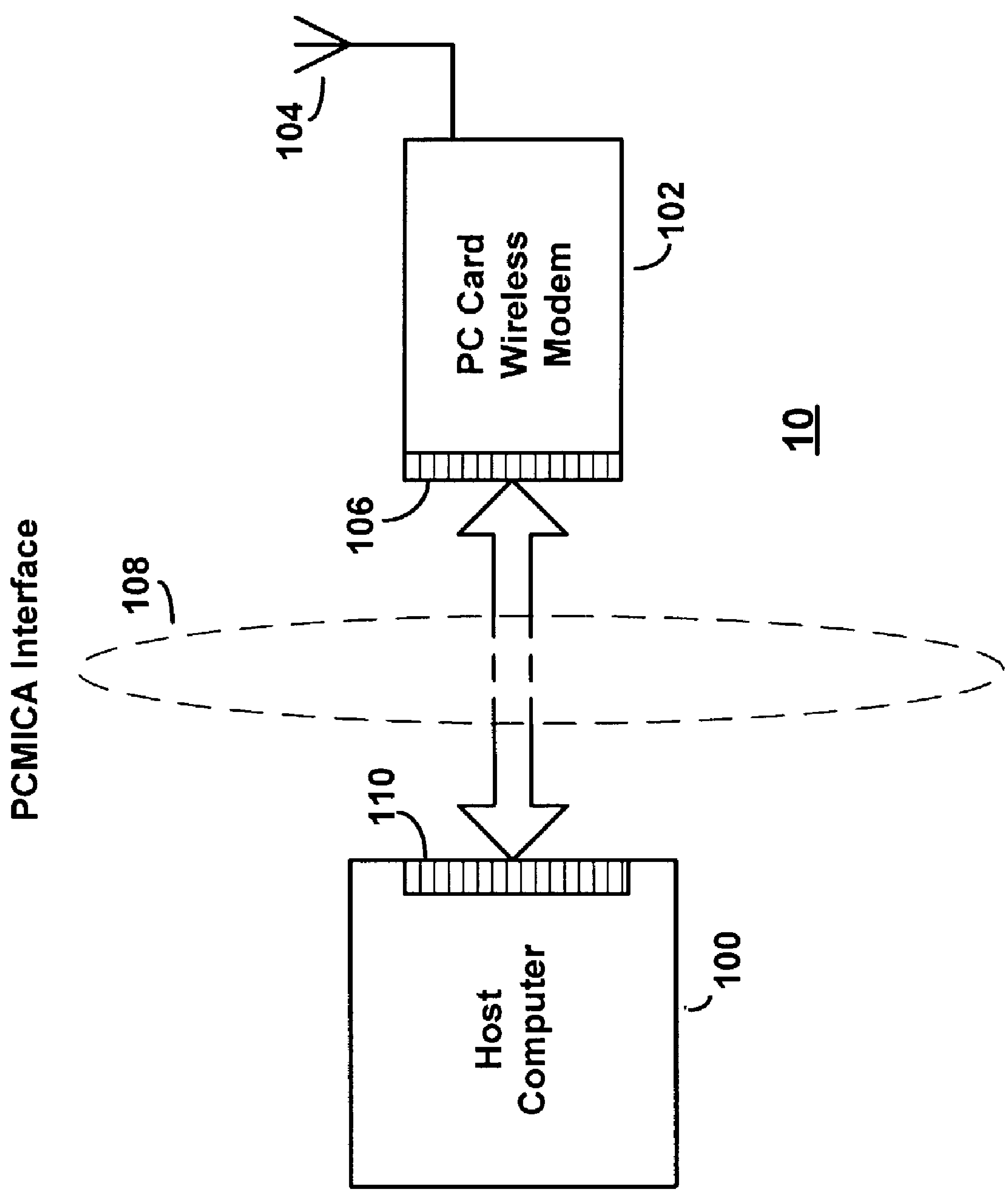


FIGURE 1 (Prior Art)

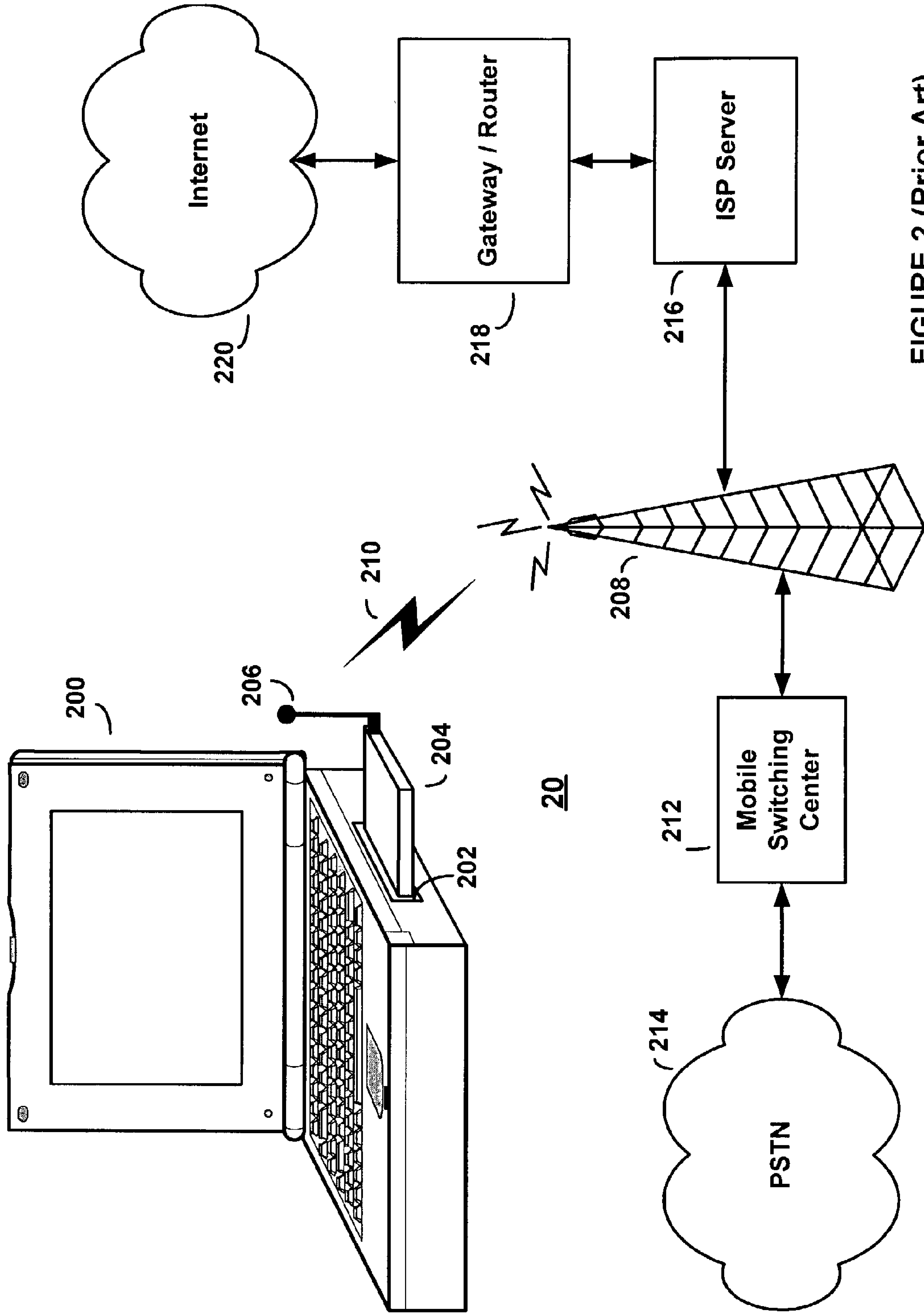


FIGURE 2 (Prior Art)

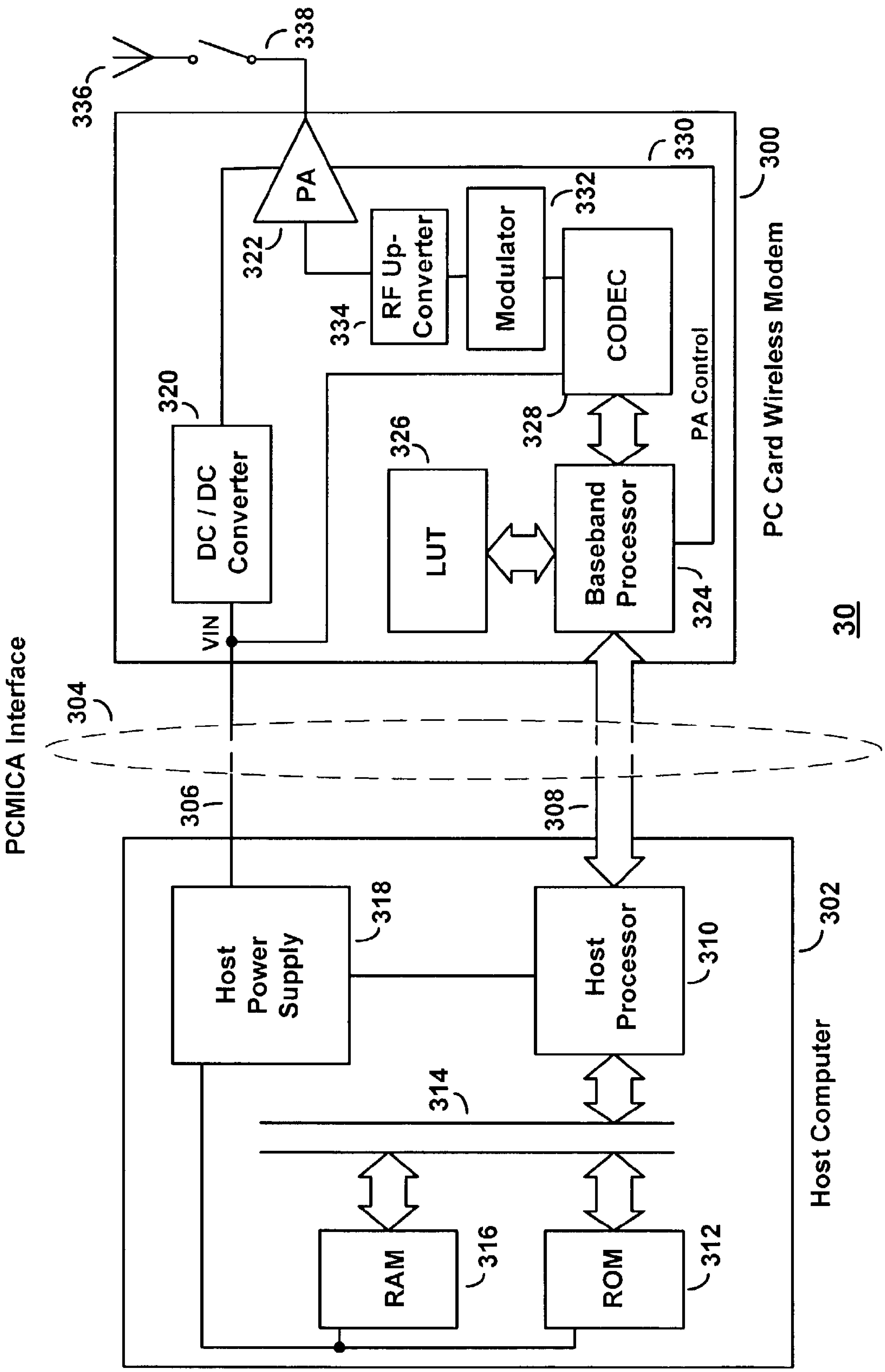

336
338
PA
322
330
300
RF Up-Converter
334
Modulator
332
CODEC
320
DC / DC Converter
VIN
326
LUT
328
PA Control
Baseband Processor
324
PC Card Wireless Modem
30
PCMICA Interface
304
306
308
Host Power Supply
318
Host Processor
310
302
314
RAM
316
ROM
312
Host Computer

FIGURE 3

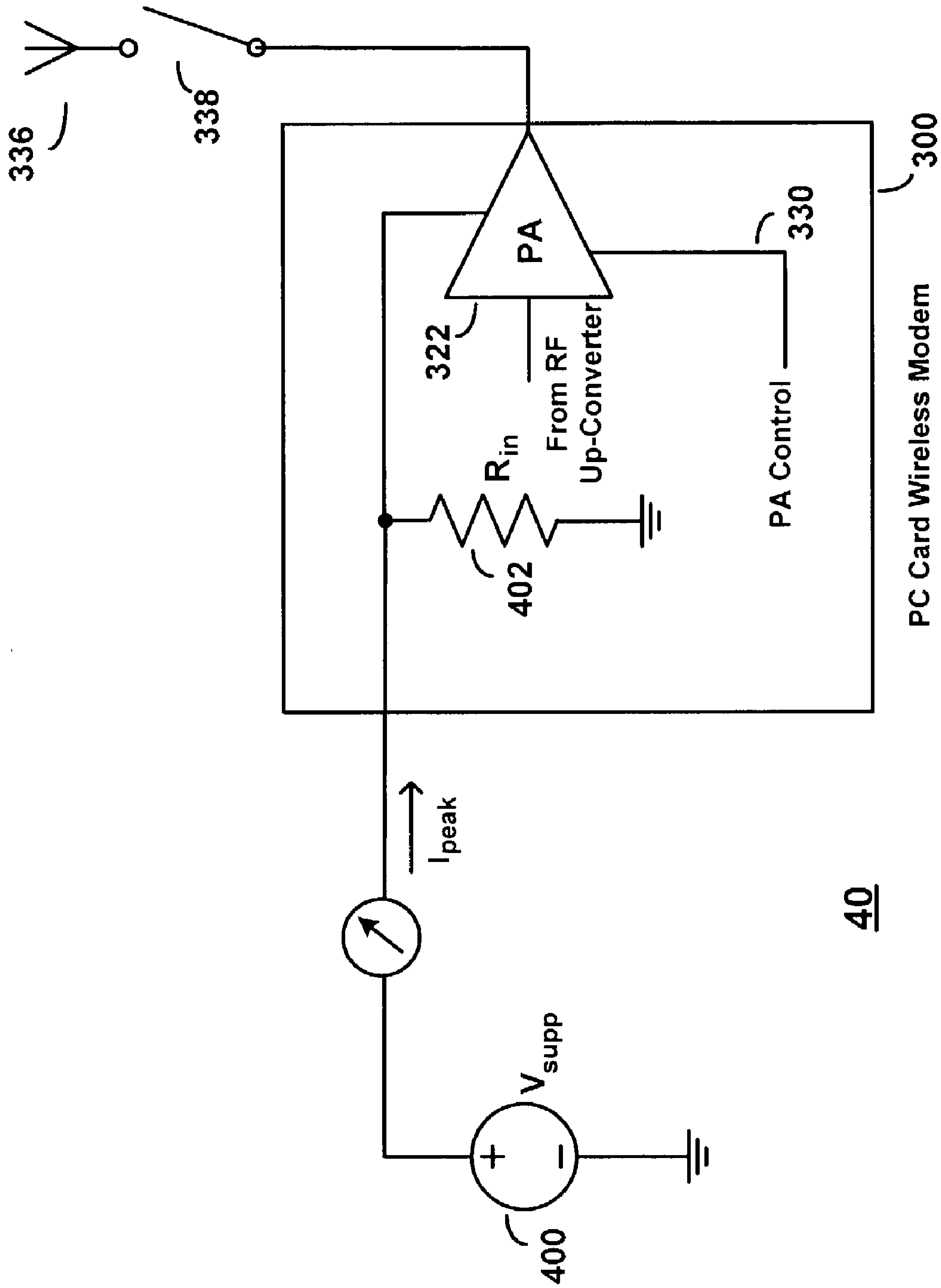

336
338
300
PA
330
322
From RF
Up-Converter
R_{in}
PA Control
PC Card Wireless Modem
402
I_{peak}
40
V_{supp}
400

FIGURE 4

TX Class and Slot Configuration	Known Ipeak (mA)	Max Resr (m-ohm)
1 slot, 1W	600	1300
2 slots, 1W	750	1070
4 slots, 1W	950	840
1 slot, 2W	750	1070
2 slots, 2W	900	880
4 slots, 2W	1100	730

FIGURE 5

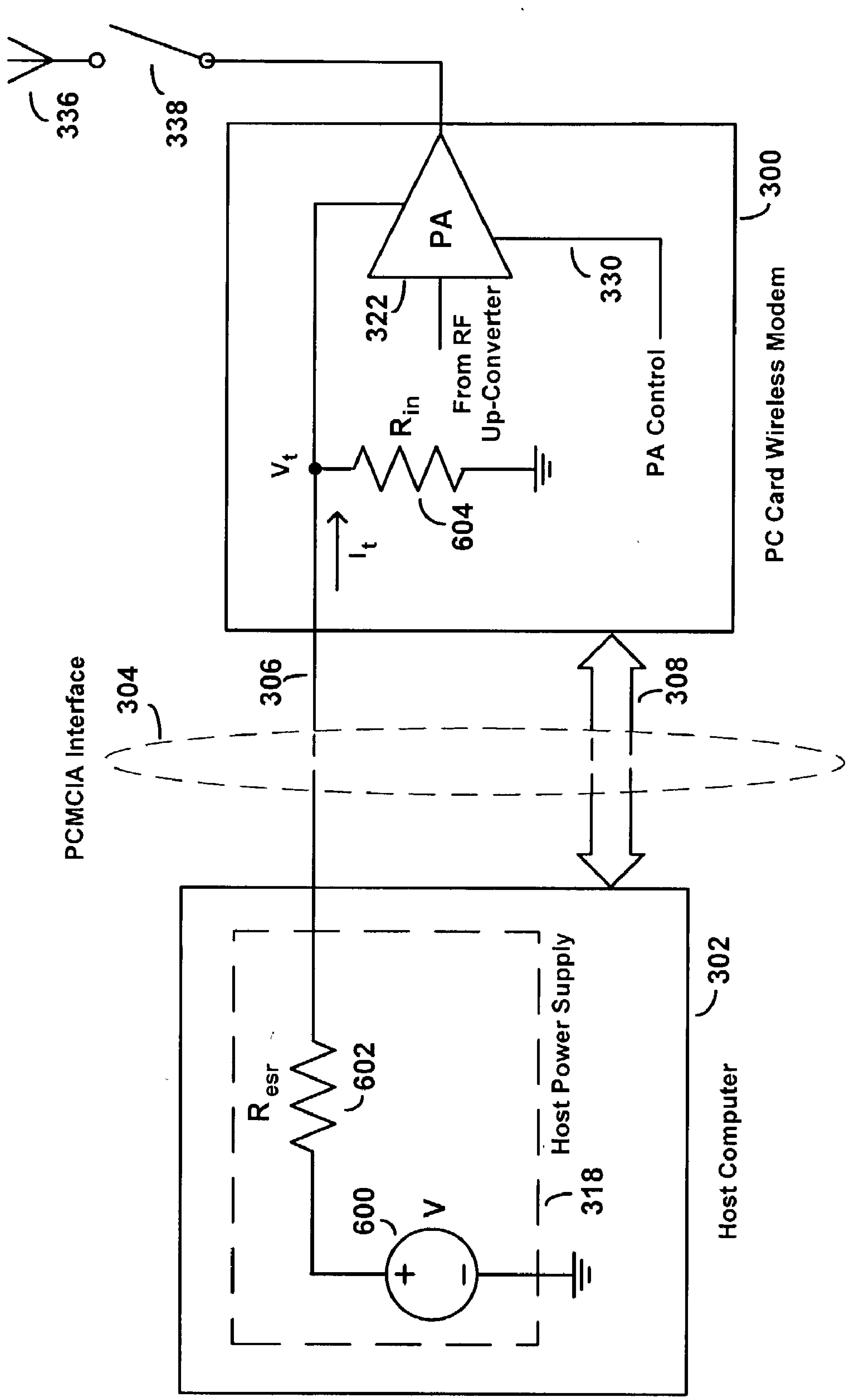

336
338
300
PA
322
From RF
Up-Converter
330
PA Control
PC Card Wireless Modem
V_t
R_{in}
604
I_t
306
308
304
PCMCIA Interface
302
Host Computer
Host Power Supply
R_{esr}
602
600
V
318
+
-

FIGURE 6

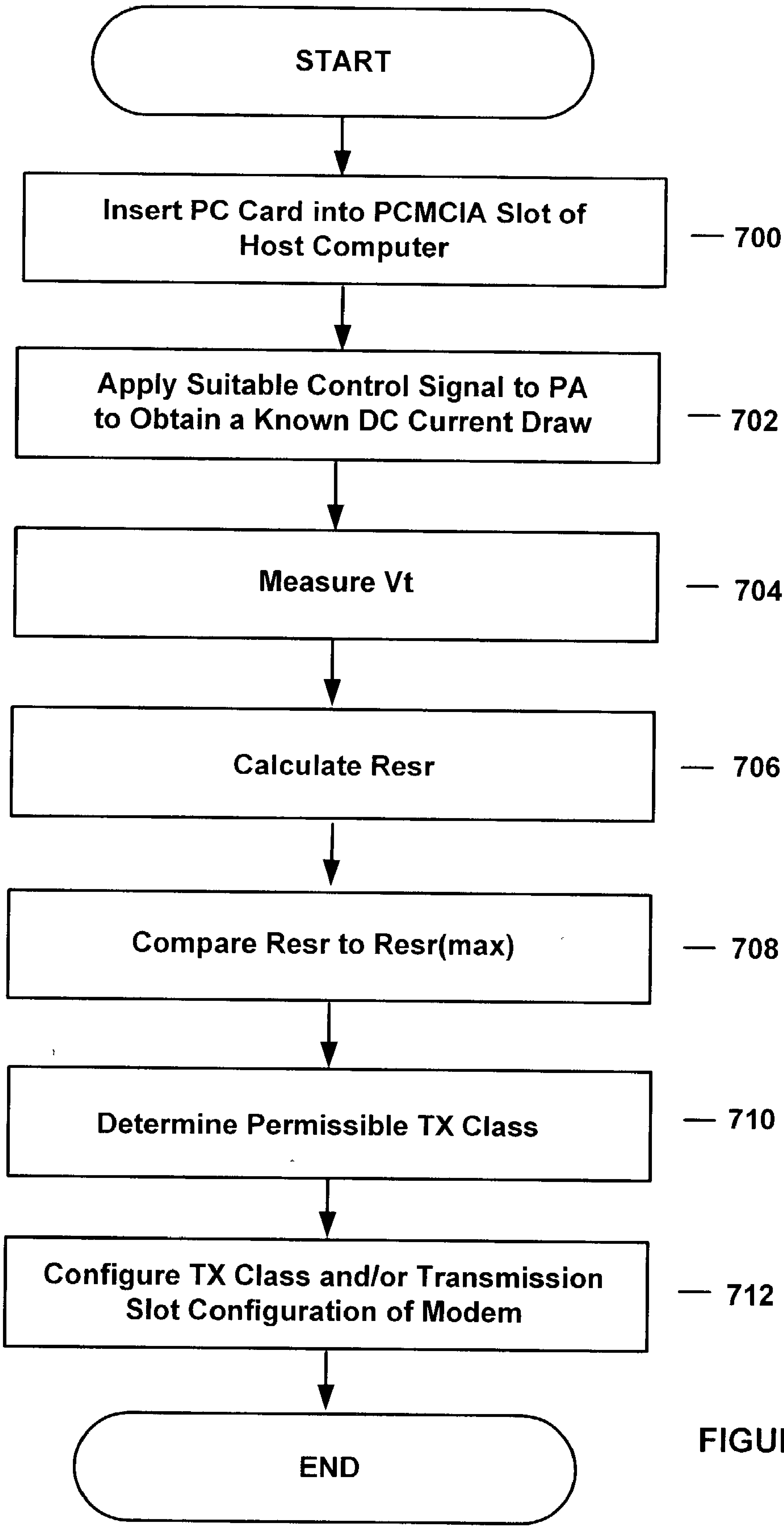

START
Insert PC Card into PCMCIA Slot of Host Computer
700
Apply Suitable Control Signal to PA to Obtain a Known DC Current Draw
702
Measure Vt
704
Calculate Resr
706
Compare Resr to Resr(max)
708
Determine Permissible TX Class
710
Configure TX Class and/or Transmission Slot Configuration of Modem
712
END

FIGURE 7

SMART HOST POWER SUPPLY DETECTION FOR PC CARD WIRELESS MODEM

FIELD OF THE INVENTION

The present invention relates to wireless communications. More specifically, the present invention relates to methods of and apparatuses for determining the power supplying capabilities of host power supplies of host computers providing power to PC card wireless modems.

BACKGROUND OF THE INVENTION

Many modern portable computers, including laptops and personal digital assistants (PDAs), have a built-in PCMCIA slot (i.e. socket) for accepting another electronic device packaged in a PC (personal computer) card conforming to the PCMCIA standard. PCMCIA (Personal Computer Memory Card International Association) is an organization that was formed in 1989 with the original purpose of developing and promoting standards for PC cards that could provide additional memory resources for the host computer. This purpose has since expanded to encompass other types of electronic devices such as, for example, PC card wireless modems that are capable of communicating with a remote device over a wireless link.

FIG. **1** shows a block diagram of a wireless-communication-enabled computer system **10** comprising a host computer **100** and a PC card wireless modem **102**. PC card wireless modem **102** includes an antenna **104** for transmitting/receiving radio frequency (RF) signals to/from a remote device over a wireless network. PC card wireless modem **102** also includes various input/output (I/O), power and ground terminals **106**, which are arranged according to the PCMCIA standard. Host computer **100** communicates with PC card wireless modem **102** via a PCMCIA interface **108**, when terminals **106** are plugged into a PCMCIA slot **110** of host computer **100**. PCMCIA interface **108** not only provides a communication means, it also includes power and ground terminals that couple a power supply of host computer **100** to the power and ground terminals of PC card wireless modem **102**.

FIG. **2** shows a wireless communications system **20** that includes a wireless-communication-enabled host computer, such as that shown in FIG. **1**. A host computer **200**, shown as a laptop, has a PCMCIA slot **202** with a PC card wireless modem **204** plugged into the slot **202**. PC card wireless modem **204** has an antenna **206** that transmits/receives RF signals modulated by data and voice information to/from a base station **208** over a wireless link **210**. Base station **208** transmits/receives voice modulated signals to/from a mobile switching center **212**, which communicates with a remote device (e.g. a telephone) over the PSTN (Public Switched Telephone Network) **214**. Base station **208** also transmits/receives data modulated signals to an ISP (Internet Service Provider) Server **216**. ISP server **216** transmits/receives data to/from a gateway/router **218**, which sends/receives the data to/from a remote over the Internet **220**.

Base station **208** in FIG. **2** may be associated with any number of networks. For example, it may be associated with a pager network or a wireless communications network used by cellular telephones. One particular cellular telephone network that is in common use in Europe and of increasing use throughout the rest of the world is GSM (Global System for Mobile communications). Besides functioning as a voice network, GSM is becoming particularly attractive to users and developers of wireless-communication-enabled computers, such as the ones described above in connection with FIGS. **1** and **2**. A large reason for this is that GSM supports packet-switched data protocols like GPRS (General Packet Radio Service). Packet-switched data makes more efficient use of available bandwidth and is typically faster than traditional circuit-switched data protocols. GPRS also supports the Internet Protocol (IP), thereby allowing users of a computing device with a GPRS-compatible PC card wireless modem to gain access to the Internet.

GPRS operates by allocating timeslots for packet data transmissions upon a request by a user and freeing up timeslots when not required by the user. The wireless-communication-enabled computer system breaks down an Internet TCP/IP (Transmission Control Protocol/Internet Protcol) data message into data packets. When the data is ready to be sent, the network assigns timeslots on a channel for the transmission. The GPRS-compatible modem transmits the data packets in the assigned timeslots to the cellular base-station where the packets are reassembled into the original TCP/IP data message and finally passed to the Internet for transport to the destination.

Timeslots in a GSM/GPRS network are delineated similar to that in TDMA (Time Division Multiple Access) technology. Each channel is divided into eight timeslots, which are then allocated to different requesting users. More than one timeslot may be requested and allocated to increases the rate at which the modem is permitted to transmit data. However, when this is done more power is demanded from the host power supply, which explained above, functions as the power source of the modem. When the current increases, the voltage supplied by the host power supply tends to drop, due to the internal resistance of the power supply. If the current demanded by the modem exceeds that capable of being delivered by the host supply, the host power supply may be damaged and/or the modem may shut down or reset. Unfortunately, the PC card wireless modem does not know what the supplying capability of the host power supply is.

One solution proposed to avoid the current overdraw problem is to include a supplemental battery pack on the PC card. This approach is undesirable, however, as it increases the size of the PC card, making it more bulky and less popular with users. Another solution would be to simply reduce or limit the RF power of the modem. This approach is also undesirable, however, as it reduces the range of operation of the modem and also unnecessarily sacrifices performance of systems in which the power supply is not the limiting factor.

SUMMARY OF THE INVENTION

Generally, methods of and apparatuses for characterizing the power supplying capabilities of host power supplies of host computers providing power to a PC card wireless modem are disclosed. The host computer may comprise any computer device, such as a laptop or personal digital assistant (PDA), which is configured to provide power to the PC card wireless modem.

According to one aspect of the invention, a method of determining permissible transmission power classes of a wireless modem, comprises the steps of determining an equivalent series resistance of the power supply, comparing the equivalent series resistance of the power supply to a plurality of maximum equivalent series resistance values associated with a corresponding plurality of transmission power classes, and designating each power class as a permisssible power class at which the wireless modem may be configured to transmit for each maximum equivalent series resistance value that is greater than the equivalent series resistance of the power supply.

According to another aspect of the invention, a method of determining whether a power supply of a host computer is capable of providing sufficient power to a PC card wireless modem, comprises the steps of determining a maximum allowable equivalent series resistance of a power supply configured to supply power to the PC card wireless modem when the modem is configured to transmit at a particular transmission power class and slot configuration, inserting the PC card wireless modem into a PCMCIA slot of a host computer having a host power supply, determining an equivalent series resistance of the host power supply, comparing the maximum allowable equivalent series resistance to the equivalent series resistance of the host power supply, and determining that the host power supply is capable of providing sufficient power to the PC card wireless modem if the equivalent series resistance of the host power supply is less than the maximum equivalent series resistance.

According to another aspect of the present invention, a wireless modem capable of configuring itself to one of a plurality of particular transmission power classes and slot configurations, comprises a DC/DC converter having a power input coupled to an output of a power supply, an analog-to-digital converter (ADC) operable to convert an input voltage applied to the power input of the DC/DC converter when the wireless modem is configured to draw a known current from the power supply, and a baseband processor operable to calculate an equivalent series resistance of the power supply, based on the input voltage applied to the power input of the DC/DC converter and the current drawn from the power supply. The baseband processor is also operable to compare the calculated equivalent series resistance to a plurality of maximum equivalent resistance values associated with a corresponding plurality of transmission power classes and slot configurations.

According to yet another aspect of the present invention, a wireless modem capable of configuring itself to one of a plurality of particular transmission power classes and slot configurations comprises a DC/DC converter means for converting an input voltage from a power supply to an output voltage, analog-to-digital converter means for converting said input voltage to a digital signal when the wireless modem is configured to draw a known current from the power supply, and baseband processor means for calculating an equivalent series resistance of the power supply, based on the input voltage applied to the power input of the DC/DC converter and the current drawn from the power supply. The baseband processor means also functions to compare the calculated equivalent series resistance to a plurality of maximum equivalent resistance values associated with a corresponding plurality of transmission power classes and slot configurations.

Other aspects of the invention are described and claimed below, and a further understanding of the nature and advantages of the inventions may be realized by reference to the remaining portions of the specification and the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows a block diagram of a wireless-communication-enabled computer system comprising a host computer and a PC card wireless modem;

FIG. **2** shows a wireless communications system that includes a wireless-communication-enabled host computer, such as that shown in FIG. **1**;

FIG. **3** shows a block diagram of a system for characterizing the current supplying capability of a host power supply of a host computer supplying power to a PC card wireless modem, according to an embodiment of the present invention;

FIG. **4** shows a test set-up, which may be used to determine a plurality of R_{esr}(max) values of a PC card wireless modem, the R_{esr}(max) values associated with a corresponding plurality of transmission power classes and slot configurations;

FIG. **5** shows an exemplary classification table for a GSM/GPRS PC card wireless modem, including R_{esr}(max) values associated with various power transmission power classes and slot configurations, according to a specific exemplary embodiment of the present invention;

FIG. **6** shows a simplified diagram of the system in FIG. **3**, which may be used to characterize the current supplying capability of host power supply of a host computer, while supplying power to a PC card wireless modem, according to an embodiment of the present invention; and

FIG. **7** shows a method of characterizing the equivalent series resistance R_{esr} of a host power supply, according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Those of ordinary skill in the art will understand that the following detailed description of the present invention is illustrative only and is not intended to be in any way limiting. Other embodiments of the present invention will readily suggest themselves to such skilled persons having the benefit of this disclosure. Reference will now be made in detail to exemplary implementations of the present invention as illustrated in the accompanying drawings. The same reference indicators will be used throughout the drawings and the following detailed description to refer to the same or like elements.

Referring to FIG. **3**, there is shown a block diagram of a system **30** for characterizing the current supplying capability of a host power supply of a host computer supplying power to a PC card wireless modem, according to an embodiment of the present invention. A PC card wireless modem **300** communicates with and is powered by a host computer **302**, via a PCMCIA interface **304** comprising a power bus **306** and communications bus **308**. Host computer **302** includes a host processor **310**, which addresses and receives processing instructions from a read only memory (ROM) **312** via host computer system bus **314**. A random access memory (RAM) **316** is also coupled to host computer system bus **314** and provides temporary storage of data, address, and control information processed by, or to be processed by, host processor **310**. Host processor **310**, ROM **312**, RAM **316** and other electrical components of host computer **302** not shown in FIG. **3** are powered by a host power supply **318**. The illustrations of both PC card wireless modem **300** and host computer **302** are simplified and do not include components that are not necessary to understand the inventions described herein. For example, whereas only the salient portions of the transmitting portion of the modem PC card wireless modem are illustrated in block **300**, those skilled in the art will readily understand that modem **300** also includes a receiving portion.

PC card wireless modem **300** is powered by host power supply **318**. Specifically, a DC/DC converter **320** of PC card wireless modem **300** is coupled to power bus **306**, such that host power supply **318** may provide power to PC card wireless modem **300**. DC/DC converter **320** operates to translate the voltage supplied by the host power supply (e.g. 5 volts) to a voltage that is appropriate to power up the modem (e.g. 3.3 volts). DC/DC converter **320** supplies power to, among other components on PC card wireless modem **300**, a power amplifier (PA) **322**. PA **322** amplifies radio frequency RF signals modulated by data messages originating from host computer **302**. The data messages, which are originally digitally formatted, are delivered over communications bus **308** to a baseband processor **324**. Baseband processor **324** processes and formats the digital data messages according to information stored in the look-up-table (LUT) **326** and then sends the processed messages to a digital-to-analog converter DAC in CODEC **328**. Baseband processor **324** also provides a PA control signal to PA **322**, on PA control line **330**, to control the amount by which PA **322** amplifies the RF signals. After the DAC in CODEC **328** converts the digital data messages into analog signals, the analog signals are modulated and converted to intermediate frequency (IF) signals by modulator **332** and then ultimately up-converted to radio frequency (RF) signals by RF up-converter **334**. The RF signals are then amplified by PA **322** and transmitted by an antenna **336** over a wireless link to a remote destination, so long as switch **338** is closed. If switch **338** is open, antenna **336** does not radiate the RF signals. Accordingly, the function of switch **338** is to connect/disconnect antenna **336** to/from the output of PA **322**. By disconnecting antenna **336**, the PC card wireless modem **300** and host power supply **318** may be tested and characterized without having to transmit the RF signals, which under test conditions may not be in compliance with wireless communications regulations, e.g., regulations set forth by the Federal Communications Commission in the United States of America.

As described in more detail below, baseband processor **324** configures PC card wireless modem **300** to transmit in a power class and/or slot configuration depending on the current supplying capabilities of host power supply **318** and information stored in LUT **326**. LUT **326** comprises a memory device, for example a FLASH memory chip, which contains a list of maximum equivalent series resistance R_{esr}(max) values that the equivalent series resistance R_{esr} of a host power supply must not exceed when the PC card wireless modem **300** is operating according to a corresponding power class and slot configuration. As explained in the next paragraph, the R_{esr}(max) values are determined and stored in LUT **326** prior to characterizing the equivalent series resistance R_{esr} of host power supply **318**.

FIG. **4** shows a test set-up **40**, which may be used to determine the R_{esr}(max) values for storing in LUT **326**. Test set-up **40** includes a test power supply **400** capable of delivering any amount of current demanded by PC card wireless modem. Hence, power supply **400** may be treated as an ideal power supply under all test conditions. From the perspective of test power supply **400**, PC card wireless modem **300** presents an input resistance, represented by resistor R_{in} **402** in FIG. **4**. During testing, baseband processor **324** (see FIG. **3**) of PC card wireless modem **300** and PA control line **330** are set so that PC card wireless modem **300** transmits in accordance with a variety of power classes and slot configurations. Switch **338** remains open during testing so that antenna **336** does not radiate while the testing is being performed. This ensures that any wireless communications RF regulations are not violated.

For each power class and slot configuration, the peak current I_{peak} drawn by PC card wireless modem **300** is measured and recorded. Then, for each of these measured peak currents an R_{esr}(max) is determined according to the following formula:

$$R_{esr}(\max)=(V_{supp}-V_{reg}(\min))/I_{peak} \quad (1)$$

where V_{reg}(min) is the minimum voltage required at the input of DC/DC converter **320** of PC card wireless modem **300** to maintain proper voltage regulation.

Each R_{esr}(max) value corresponds to a specific transmission power class and slot transmission configuration that is unique to PC card wireless modem **300**. These R_{esr}(max) values are stored in LUT **326**. As explained in more detail below, the equivalent series resistance R_{esr} of host power supply **318** is measured and compared to the R_{esr}(max) values stored in LUT **326** to determine which power classes and slot configurations host power supply **318** is capable of supporting. FIG. **5** shows an exemplary classification table for a GSM/GPRS PC card wireless modem for various transmission (TX) power classes and slot configurations. Similar classification tables can be created for other types of cellular networks, e.g., DCS (Digital Communication System), PCS (Personal Communications Service), etc. The peak currents I_{peak} recorded in the table in FIG. **5** were measured according to the method described above and the corresponding R_{esr}(max) values were determined using formula (1) with a V_{reg}(min) of 4.2 volts.

Referring now to FIG. **6**, there is shown a simplified diagram of system **30** in FIG. **3**, for characterizing the current supplying capability of host power supply **318** while supplying power to PC card wireless modem **300**, according to an embodiment of the present invention. Host computer **302** includes a power supply **318** that provides power to PC card wireless modem **300** via power bus **306**, which explained above comprises part of PCMCIA Interface **304**. Host power supply **318** comprises an ideal voltage supply component **600** and an equivalent series resistor **602** having an equivalent series resistance R_{esr}. From the perspective of host power supply **318**, PC card wireless modem **300** presents an input resistance, which is represented by resistor R_{in} **604** in FIG. **6**.

Referring now to FIG. **7**, there is shown a method **70** of characterizing the equivalent series resistance R_{esr} of host power supply **318**, according to an embodiment of the present invention. First, at step **700** PC card wireless modem **300** is inserted into the PCMCIA slot of host computer **302**, thereby interfacing PC card wireless modem in accordance with PCMCIA interface **304**. Next, at step **702** baseband processor **324** sends a PA control signal on PA control line **330** to PA **322**, to adjust the modem so that the modem test input current I_t is set to a constant value (e.g. 1 A in one exemplary embodiment) within the normal supply range of host power supply **318**. With this known test current being drawn, at step **704** the test input voltage V_t applied to PC card wireless modem **300** is measured and recorded. Test input voltage V_t may be measured by an external voltage-measuring device (e.g. a voltmeter) or by an analog-to-digital converter ADC in CODEC **328**. With knowledge of V_t and I_t and the input voltage and current V_i and I_i of the modem in its idle state, the equivalent series resistance R_{esr} of power supply **318** is calculated in step **706** using the following formula:

$$R_{esr}=(V_i-V_t)/(I_t-I_i) \quad (2)$$

Note that the idle voltage and current, V_i and I_i, can be measured during manufacturing testing or in a test set-up similar to that shown and described in connection with FIG.

4 or 6. Formula (2) is based on the observation that the R_{esr} of most power supplies remains essentially constant, at least over the range of load currents applied in the formula.

After the equivalent series resistance R_{esr} of host power supply **318** is calculated, at step **708** baseband processor **324** compares R_{esr} of host power supply **318** to the R_{esr}(max) values stored in LUT **326**. Based on the comparison in step **708**, at step **710** baseband processor **324** determines the permissible transmission power classes and slot configurations that PC card wireless modem **300** may operate at when powered by host power supply **318**. As an example, if the R_{esr} of host power supply is calculated to be 900 mΩ and the R_{esr}(max) values stored in LUT **326** are those shown in the classification table in FIG. **5**, baseband processor **324** would determine that, when powered by a power supply like host power supply **318**, PC card wireless modem **300** could be configured for single or dual slot transmission at 1 W or single slot transmission at 2 W. Because the R_{esr}(max) values for the other slot configurations and power classes are less than R_{esr}=900 mΩ, they would not be permissible when being powered by a power supply like host power supply **318**. Finally, at step **712** baseband processor **320** configures PC card wireless modem **300** so that it transmits according to one of the permissible power class and slot configurations determined in step **710**.

Whereas the above is a complete description of the preferred embodiments of the invention, various alternatives, modifications, and equivalents may be used. For example, whereas a PC card socketed in a PCMCIA slot of a host computer has been described in the exemplary embodiments above, the methods described above also apply to other types of card/slot types where a host device includes a host supply that provides power to the wireless modem. Therefore, the above description should not be taken as limiting the scope of the invention, which is defined by the appended claims.

What is claimed is:

1. A method of determining permissible transmission power classes of a wireless modem, comprising the steps of:

determining an equivalent series resistance of the power supply;

comparing the equivalent series resistance of the power supply to a plurality of maximum equivalent series resistance values associated with a corresponding plurality of transmission power classes; and

designating each power class as a permissible power class at which the wireless modem may be configured to transmit, for each maximum equivalent series resistance value that is greater than the equivalent series resistance of the power supply.

2. The method of claim **1** wherein the wireless modem comprises a PC card wireless modem and the power supply comprises a host power supply of a host computer.

3. The method of claim **2** wherein the PC card wireless modem communicates with and is powered by the host computer via a PCMCIA interface.

4. The method of claim **1**, further comprising a step of configuring the modem to transmit according to one of the permissible transmission power classes.

5. The method of claim **1** wherein each transmission power class includes the number of transmission slots to be used for transmitting packet-switched data over a cellular network.

6. The method of claim **5** wherein the cellular network comprises the Global System for Mobile Communications (GSM) network.

7. The method of claim **5** wherein the cellular network comprises the Personal Communications Service (PCS) network.

8. A method of determining whether a power supply of a host computer is capable of providing sufficient power to a PC card wireless modem, said method comprising the steps of:

determining a maximum allowable equivalent series resistance of a power supply configured to supply power to the PC card wireless modem when the modem is configured to transmit at a particular transmission power class and slot configuration;

inserting the PC card wireless modem into a PCMCIA slot of a host computer having a host power supply;

determining an equivalent series resistance of the host power supply;

comparing the maximum allowable equivalent series resistance to the equivalent series resistance of the host power supply; and

determining that the host power supply is capable of providing sufficient power to the PC card wireless modem if the equivalent series resistance of the host power supply is less than the maximum equivalent series resistance.

9. The method of claim **8**, further comprising a step of configuring the modem to transmit according to the particular transmission power class and slot configuration.

10. The method of claim **1** wherein data to be transmitted by the modem comprises packet-switched data for transmitting over a cellular network.

11. The method of claim **10** wherein the cellular network comprises the Global System for Mobile Communications (GSM) network.

12. The method of claim **11** wherein the cellular network comprises the Personal Communications Service (PCS) network.

13. A wireless modem capable of configuring itself to one of a plurality of particular transmission power classes and slot configurations, comprising:

a DC/DC converter having a power input coupled to an output of a power supply;

an analog-to-digital converter (ADC) operable to convert an input voltage applied to the power input of the DC/DC converter when the wireless modem is configured to draw a known current from the power supply; and

a baseband processor operable to calculate an equivalent series resistance of the power supply, based on the input voltage applied to the power input of the DC/DC converter and the current drawn from the power supply, and compare the calculated equivalent series resistance to a plurality of maximum equivalent resistance values associated with a corresponding plurality of transmission power classes and slot configurations.

14. The wireless modem of claim **13** wherein the baseband processor configures the wireless modem to transmit according to any one of the plurality of transmission power classes and slot configurations of which the equivalent series resistance of the power supply is less than the corresponding maximum equivalent resistance values.

15. The wireless modem of claim **13**, further comprising a memory in communication with the baseband processor and configured to store the plurality of maximum equivalent series resistance values.

16. The wireless modem of claim **13** wherein the wireless modem comprises a PC card wireless modem and the power supply comprises a host power supply of a host computer.

17. The wireless modem of claim **16** wherein the PC card wireless modem communicates with and is powered by the host computer via a PCMCIA interface.

18. The wireless modem of claim **13** wherein the baseband processor configures data to be transmitted by the wireless modem as packet-switched data suitable for transmission over a cellular network.

19. The wireless modem of claim **18** wherein the cellular network comprises the Global System for Mobile Communications (GSM) network.

20. The wireless modem of claim **18** wherein the cellular network comprises the Personal Communications Service (PCS) network.

21. The wireless modem of claim **16** wherein the baseband processor configures data to be transmitted by the PC card wireless modem as packet-switched data suitable for transmission over a cellular network.

22. The wireless modem of claim **21** wherein the cellular network comprises the Global System for Mobile Communications (GSM) network.

23. The wireless modem of claim **21** wherein the cellular network comprises the Personal Communications Service (PCS) network.

24. A wireless modem capable of configuring itself to one of a plurality of particular transmission power classes and slot configurations, comprising:

a DC/DC converter means for converting an input voltage from a power supply to an output voltage;

analog-to-digital converter means for converting said input voltage to a digital signal when the wireless modem is configured to draw a known current from the power supply; and

baseband processor means for calculating an equivalent series resistance of the power supply, based on the input voltage applied to the power input of the DC/DC converter and the current drawn from the power supply, and for comparing the calculated equivalent series resistance to a plurality of maximum equivalent resistance values associated with a corresponding plurality of transmission power classes and slot configurations.

25. The wireless modem of claim **24** wherein the baseband processor means is further operable to configure the wireless modem to transmit according to any one of the plurality of transmission power classes and slot configurations of which the equivalent series resistance of the power supply is less than the corresponding maximum equivalent resistance values.

26. The wireless modem of claim **24**, further comprising memory means for storing and providing store the plurality of maximum equivalent series resistance values.

27. The wireless modem of claim **24** wherein the wireless modem comprises a PC card wireless modem and the power supply comprises a host power supply of a host computer.

28. The wireless modem of claim **24** wherein the baseband processor means is further operable to configure data to be transmitted by the wireless modem as packet-switched data suitable for transmission over a cellular network.

29. The wireless modem of claim **28** wherein the cellular network comprises the Global System for Mobile Communications (GSM) network.

30. The wireless modem of claim **28** wherein the cellular network comprises the Personal Communications Service (PCS) network.

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